

Space Shuttle/International Space Station

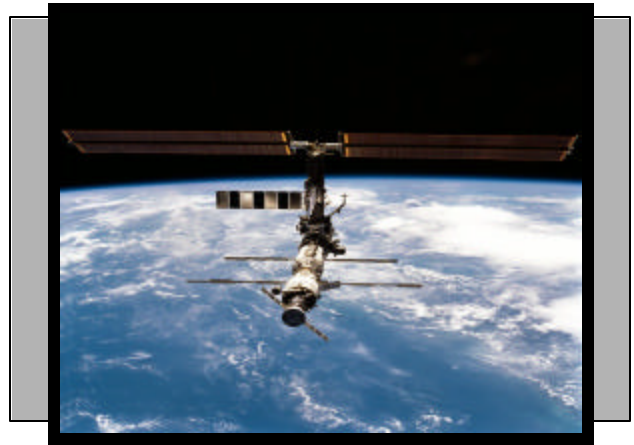
Earth Observation Photography

Astronauts have used hand-held cameras to photograph the Earth for more than 30 years. Beginning with the Mercury missions in the early 1960s, astronauts have taken nearly 400,000 photographs of the Earth. **The International Space Station (ISS)** will continue the NASA tradition of Earth observation from human tended spacecraft. Earth observation documented with hand held cameras began on ISS in November 2000. The ISS is well suited for observations: Its average altitude will be 220 miles (407 km) above the Earth. Its orbital inclination of 51.6° includes most of the coastlines and heavily populated areas of the world.

The Destiny U.S. Laboratory Module has a science window, with a clear aperture 50.8 cm in diameter, that is perpendicular to the Earth's surface most of the time. The window's three panes of fused silica are of optical quality. Instrumentation for Earth observation includes hand held cameras and imaging systems under development.

Astronauts are trained in scientific observation of geological, oceanographic, environmental, and meteorological phenomena, and in the use of photographic equipment and techniques. Scientists on the ground have selected a series of areas to be photographed as part of the Crew Earth Observations science payload. Messages are routinely sent to the station crew members listing the best opportunities for meeting these goals. The sites selected include major deltas in South and East Asia, coral reefs, major cities, smog over industrial regions, areas that typically experience floods or droughts triggered by El Nino cycles, alpine glaciers, tectonic structures, and features on Earth, such as impact craters, that are analogous to structures on Mars.

Hand-held photography fills a niche between aerial photography and imagery from satellite sensors and complements these two formats with additional information. Near real-time information exchange between the crew and scientists expedites the recording of dynamic events of geological, oceanographic, environmental, and meteorological importance. Critical environmental monitoring sites are photographed repeatedly over time; some have photographic records dating back to the Gemini and Skylab missions. Data can be used to develop maps of land cover change. Earth limb pictures taken at sunrise and sunset document changes in the Earth's atmospheric layering. Photographs of hurricanes, thunderstorms, squall lines, island cloud wakes, and the jet stream supplement satellite images by offering high resolution, stereoscopic coverage of such phenomena. Photographs, electronic images, and verbal observations of Earth made by the flight crews of the International Space Station will be used not only as scientific data, but also to educate students and the general public about the Earth.



Above: International Space Station

Below: Sergei Krikalev, on board the Space Station, looks out the U.S. Laboratory window on March 18, 2001.



How to View Images and Obtain Information on Astronauts' Photographs

World Wide Web:

Search and view all photos at
the following URL:

<http://eol.jsc.nasa.gov>

View a collection of outstanding
photos with captions:

<http://earth.jsc.nasa.gov>

Read about Crew Earth
Observations on ISS at:

<http://eol.jsc.nasa.gov/worf>

Email:

earthweb@ems.jsc.nasa.gov

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Analysis Laboratory

Mail Code SX3

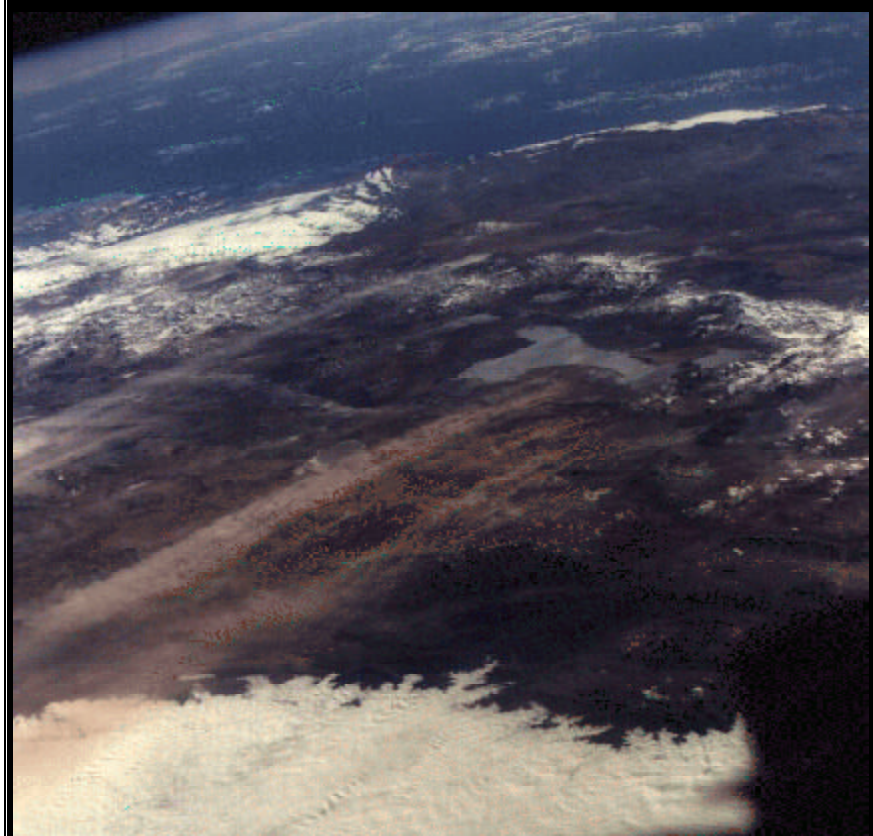
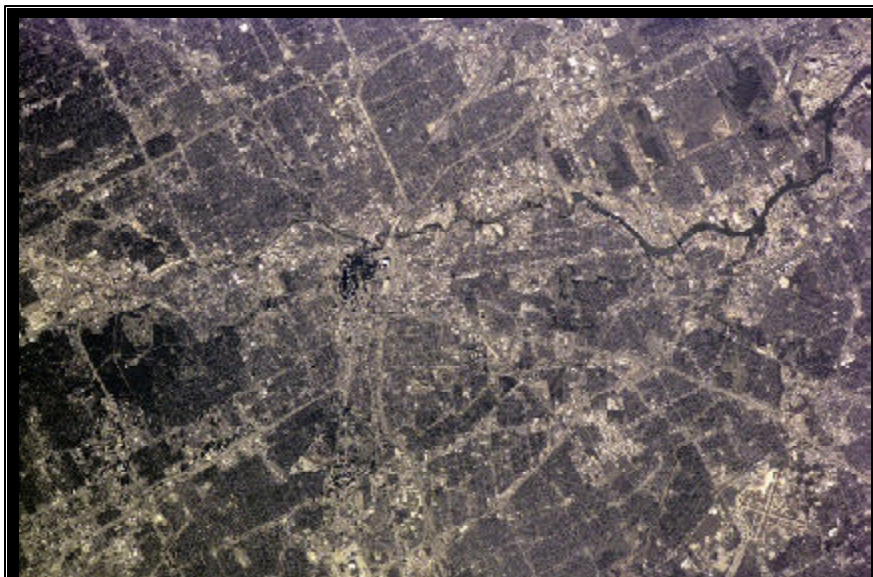


National Aeronautics and
Space Administration

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Top photo: Downtown Houston as seen from the International
Space Center (ISS 001-ESC-6285)

Bottom photo: Dust Blows off the high Andes
(STS 008-46-936)